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# Two types of energetic radiation associeted with thunderstorm activity observed in Japan

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The dose rate of the gamma-rays increases in association with the activities of the thunderstorm. They were observed on the ground in the winter season of Japan. As an observed result, the following two types of the radiation enhancements have been found during the winter thunderstorm activities; the gradual variation of photon intensity with energy of a few MeV, and the burst type of the radiation that is attributed to the injection of high energy photons with the energy over 10MeV. Furthermore, fluctuations of energetic radiation that were seemed to be caused by a summer thunderstorm activity were observed at the top of Mt. Fuji. The largest of such fluctuations was gradual and lasted for about 20 minutes, and was found to be high-energy gamma rays having a continuous energy spectrum up to 10 MeV or more. As for the feature of the gradual fluctuations, it seems naturally that such fluctuations are caused by the bremsstrahlung photons generated by the energetic electrons produced continuously with an intense electric field in the thundercloud.